

## Cheme 160/260: Important Concepts, Lectures 1-8

### Lecture 2:

Constitutional: head to tail etc.

Configurational: meso vs. racemic

Conformational: g+, g-, t

Relationship between end to end distance,  $R_g$ , molecular weight,

### Lecture 3:

Step Growth Polymerization

- Number fraction distribution

- Carother's Equation

- weight distribution

Molecular Weight

- Number average and weight average

- Calculated from weight distribution **or** number distribution

- Integral expressions

Polydispersity/Variance of Distribution

### Lecture 4:

Chemical Potential and activity: effect of solvent, pressure, temperature on these quantities

Van't Hoff Equation -> higher order correction terms

2<sup>nd</sup> virial coefficient: effect of solvent on this quantity.

Zimm Plot: Understand how it is obtained, see pg 94-95 in sperling

Light scattering (relatively less important)

### Lecture 5:

Definitions and interrelationships between viscosities

Chain expansion and relationship to chain effective volume and viscosity

Mark Houwink Eqn, relating molecular weight to viscosity

GPC Calibration

SUMMARY OF USEFUL EQUATIONS

### Lecture 6:

Stabilization of a free radical center: effects of monomer molecular structure

Initiation, Propagation, Termination (coupling, disproportionation)

Rate Equations, Rate constants (have idea of values)

Kinetic Chain Length

Chain Transfer

- to polymer (backbiting), monomer, solvent, transfer agent

- effects on degree of polymerization

- molecular structure as it effects ability of molecule to "receive" a radical

Rate and rate constant energetics

- effect on polymerization rate

- effect on degree of polymerization

Autoacceleration (I'd suggest supplementing lecture notes in this area with outside reading)

**Lecture 7:**

Lots of probability

Conditional Probability of different orders:

- how much of a sequence effects the next monomer added?
- 1,2,3 monomers back? (bernouillion, terminal, penultimate)

Chi = Interaction Parameter

Average Lengths of A/B runs

**Lecture 8:**

Composition of copolymers:

- Propagation reactions and rates
- Ratios of rates (r values)
- Instantaneous composition
- Effects of feed-rate, relationship between feed-rate and composition
- Special Cases of r values: ideal case, azeotropic, alternating
- Q-e- scheme

Relating observed compositions to conditional probabilities

Calculation of interaction parameter